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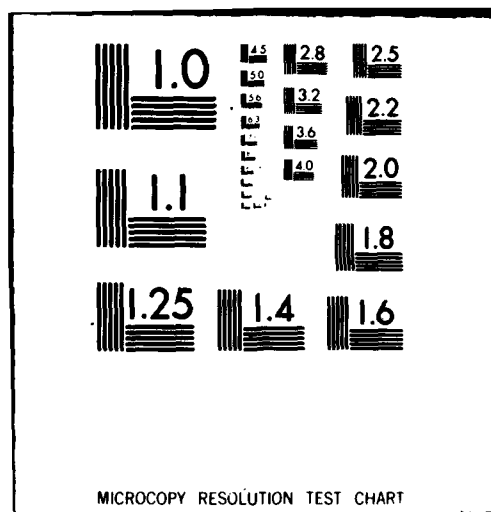
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ABSTRACTS OF PAPERS PRESENTED AT RECENT CONFERENCES

By
G. Carleton Ray, Douglas Wartzok, and
Francis H. Fay

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20. ABSTRACT (Continue on reverse side if necessary and identify by block number) The abstracts of the following presentations are included in this technical report: F.H. Fay and G.C. Ray, 1979. (1) Reproductive behavior of the Pacific walrus in relation to population structure. Presented at the 29th Alaska Science Conference, August 1978. D. Wartzok, 1979. (2) Phocid spectral sensitivity curves. Presented at the Third Biennial Conference on the Biology of Marine Mammals, October 1979.		

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Proceedings of the
29th Alaska Science Conference

ALASKA FISHERIES:
200 YEARS AND
200 MILES OF CHANGE

Brenda R. Melteff,
Editor

Sea Grant Report 79-6
August 1979

REPRODUCTIVE BEHAVIOR OF THE PACIFIC WALRUS IN RELATION TO POPULATION STRUCTURE

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Institute of Marine Science
University of Alaska
Fairbanks, Alaska

G. C. Ray
The Johns Hopkins University
Baltimore, Maryland

ABSTRACT

The biological aspects of reproduction of Pacific walruses have been studied in considerable detail over the past 50 years by investigators from the Soviet Union and the United States. However, two points relevant to understanding population dynamics have remained unknown: (1) the composition of the population and (2) the nature of the mating system. The population has been estimated to comprise about 40 percent immature animals and 60 percent adults, and the sex ratio of the adults has been assumed to be 1:1. On the basis of their sexual dimorphism, walruses are believed to be polygynous; however, convincing evidence of this during the presumed April-June Mating season has not been forthcoming.

Histological evidence now indicates that the mating season is from January to April. Hence, we have studied walrus behavior at that time and, concurrently, sampled the composition of the population. Our findings suggest that the population as a whole comprises about 35 percent immatures, 15 percent adult males, and 50 percent adult females; that is, the sex ratio of animals of breeding age appears to be at most 1:3. During the mating season, nearly all of the adult females and the largest males (bulls) congregate in two areas: north-central and southeastern Bering Sea. There, the potentially estrus females occur in herds, separate from the near-term pregnant females. Each of those herds is attended by one or more bulls, in a ratio of about 1 bull per 15 females. When the females are on the ice, at rest, the bulls take up stations 5 to 7 m apart in the water alongside them and engage in ritualistic displays, which include stereotyped, repetitive vocalizations, performed both underwater and at the surface. Fighting between bulls occurs when one invades the display station of another. The smaller or younger bulls remain peripheral to the group. Females occasionally leave the resting herd and engage in facial and bodily contact with a displaying bull. Probably, copulation takes place underwater.

The mating organization implied by these observations somewhat resembles an arena or lek system, in that the males engage in ritualized display in what could be regarded as small central territories; the subdominant bulls take peripheral positions and do not display; and male-female courtship and, probably copulation, take place only or principally with the displaying bulls in the central arena. However, the arena is mobile, being located wherever the females stop for a rest, rather than in a specific, traditional site. In any case, polygyny is strongly indicated and, as in other polygynous pinnipeds, is correlated with an unequal sex ratio of adults and with sexual dimorphism.

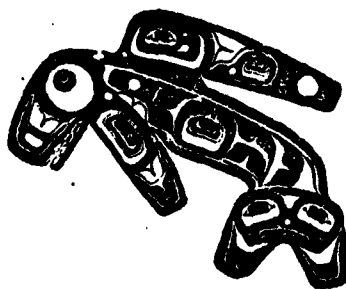
These findings are of considerable significance to management of the walrus resource, since they suggest that the productivity of the population is much higher than was predicted previously. Because the sex ratio at birth is 1:1, they suggest also

that there is a substantial "surplus" of immature males that could be harvested without affecting the structure or productivity of the adult population. Present information on these two points is not conclusive; much additional information needs to be gathered.

The work was sponsored in part (Fay) by the Alaska Sea Grant Program, supported by NOAA Office of Sea Grant, Department of Commerce, and in Part (Ray) by the Office of Naval Research. A full report is in preparation for the first volume of joint marine mammal studies under the US-USSR Marine Mammal Project, to be published in 1979.

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ABSTRACTS FROM PRESENTATIONS AT THE
THIRD BIENNIAL CONFERENCE OF
THE BIOLOGY OF MARINE
MAMMALS



October 7-11, 1979

The Olympic Hotel, Seattle, Washington

PHOCID SPECTRAL SENSITIVITY CURVES. Douglas Wartzok,
The Johns Hopkins University, Baltimore, Maryland 21205

Rod-dominated spectral sensitivity curves were determined for two species of phocids, Phoca largha and P. vitulina concolor. Thresholds were obtained using psychophysical tracking techniques. The stimulus was a four-sectored disc with two opposite sectors translucent and two opaque. The stimulus was presented either moving or stationary. The curves were determined under two adapting light intensities: $10^{-7} \mu\text{W}/\text{mm}^2$ and $0.5 \mu\text{W}/\text{mm}^2$. Both species had virtually identical curves. Peak sensitivity was centered at about 530 m μ under both high and low adapting light levels. Threshold values at 530 m μ were 1.12×10^{-9} and $6.8 \times 10^{-15} \mu\text{W}/\text{mm}^2/\text{steradian}/\text{m}\mu$ respectively for the two adapting light levels. These results imply that fully dark-adapted seals would be capable of visually detecting a moving object on a moonlit night at depths of 466 m in clear oceanic waters (extinction coefficient of 0.033) and 103 m in clear coastal waters (extinction coefficient of 0.12).